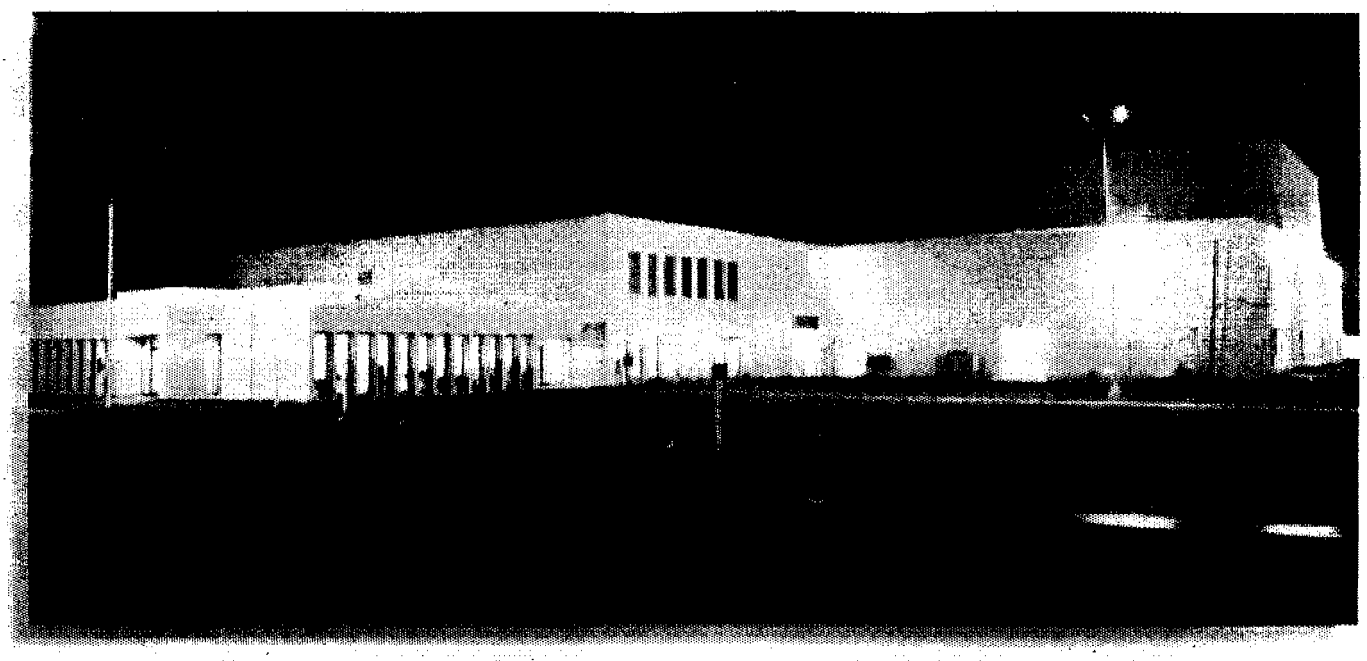
NOTICE

All drawings located at the end of the document.



STARMET
Metallurgical Excellence

2229 Main Street
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Source Removal at Trench 1 IHSS 108

Final Work Plan
April 1998

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Metallurgical Excellence

STARMET FINAL WORK PLAN FOR THE SOURCE REMOVAL AT TRENCH 1 IHSS 108

Submitted By:

STARMET CORPORATION
2229 MAIN STREET
CONCORD, MA 01742

RF/RMRS-98-231

April 1998

Administrative Information

Site:	Rocky Flats Environmental Technology Site (RFETS), Golden, Colorado
Project Name:	Source Removal at Trench 1 – IHSS 108
Date Prepared:	April 1, 1998

Approvals

I have read and approved this Work Plan.

Wayne Sproat
RMRS Project Manager — Date: 4/9/98

Ken Gillespie
RMRS Site Safety Officer — Date: 4/9/98

Greg DiGregorio
RMRS Quality Assurance — Date: 4-8-98

Mark Burmeister
RMRS Deputy Project Manager — Date

John Miller
RMRS Radiological Engineering — Date: 4-8-98

Don Barbour
Starmet Project Manager — Date

Nick Lombardo
Starmet Project Supervisor — Date: 4/9/98

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Acronym List

ACE	Activity Control Envelope
ALARA	As Low as Reasonably Achievable
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CRZ	Contaminant Reduction Zone
CTR	Contract Technical Representative
DOE	Department of Energy
DQO	Data Quality Objective
DU	Depleted Uranium
EPA	U.S. Environmental Protection Agency
EZ	Exclusion Zone
FIDLER	Field Instrument for the Detection of Low-Energy Radiation
HASP	Health and Safety Plan
HCA	High Contamination Area
IDM	Investigative Derived Material
IHSS	Individual Hazardous Substance Site
K-H	Kaiser-Hill Corporation
NPL	National Priorities List
OU	Operable Unit
PPE	Personnel Protective Equipment
PSR	Project Summary Report
RADCON	Radiation Control
RBA	Radiation Buffer Area
RCM	Radiological Control Manual
RCRA	Resource Conservation and Recovery Act
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RMA	Radioactive Material Area
RMRS	Rocky Mountain Remediation Services
RQ	Reportable Quantity
RWP	Radiological Work Permit
SAP	Sampling and Analysis Plan
SIP	Sampling and Inerting Pad
SOP	Standard Operating Procedure
SVOC	Semivolatile Organic Compounds
VOC	Volatile Organic Compounds
WAC	Waste Acceptance Criteria

1 Introduction

This Work Plan for Pyrophoric Depleted Uranium Source Removal from Trench T-1 (IHSS 108) (T-1 Trench) at the Rocky Flats Environmental Technology Site (RFETS), describes the approach to completing waste segregation, sampling, analysis, packaging, transportation, off-site treatment and on-site support activities associated with the removal of materials from T-1 Trench.

The removal of materials from T-1 Trench is an accelerated action to remove and stabilize potentially pyrophoric uranium and remove and treat soils and other associated materials. Excavation of the trench materials will be conducted by Rocky Mountain Remediation Services (RMRS). Starmet will conduct waste segregation, sampling, packaging, and treatment.

2 Site/Project Background

2.1 Site Background

The Rocky Flats Environmental Technology Site (RFETS) is located approximately 16 miles northwest of Denver, Colorado, in northern Jefferson County (Figure 1). The site occupies approximately 10 square miles, with buildings located within an industrial complex of approximately 400 acres. RFETS is a government-owned, contractor operated facility that has been in operation since 1952. Kaiser-Hill Corporation (K-H) is currently managing the site for the Department of Energy (DOE); RMRS is contracted by K-H for site environmental cleanup and waste management.

Until January 1992, RFETS was involved in manufacturing the plutonium component of nuclear weapons, reprocessing scrap metal and plutonium from dismantled weapons, conducting laboratory research on properties of nuclear materials, and fabricating steel and beryllium components. Because of past waste management activities, RFETS was proposed for inclusion on the Superfund National Priorities List (NPL) in 1984 and was included on the NPL in October 1989. RFETS is currently engaged in environmental restoration, waste management, and decontamination and decommissioning activities. Cleanup is being conducted under the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The U.S. Environmental Protection Agency (EPA) and the Colorado Department of Public Health and Environment (CDPHE) are the regulatory agencies that oversee assessment and cleanup activities at RFETS.

2.2 Project Background

The T-1 Trench, Individual Hazardous Substance Site (IHSS) 108 is located within the Buffer Zone Operable Unit (OU) and is ranked number five in the Environmental Ranking, Attachment 4 to the Rocky Flats Cleanup Agreement (RFCA). Remediation of the Trench is being conducted in accordance with the RFCA and a Proposed Action Memorandum (PAM) for Source Removal at the Trench T-1 Site IHSS 108, which was prepared to describe remediation goals and activities. The following project background has been taken from the PAM (RMRS 1997a).

The T-1 Trench is located approximately 40 feet south of the southeast corner of the Protected Area (PA) (Figure 2). The Trench is approximately 250 feet long, 16 to 22 feet wide, and 10 feet deep. Information on past disposal activities has been obtained from historical records and interviews with workers. Information on the nature and extent of potential contamination at T-1 Trench has been obtained during the RCRA Facility Investigation/Remedial Investigation Program (RFI/RI) at RFETS.

2.2.1 Past Disposal History

Historical documentation indicates that 125, 30 and 55 gallon steel drums of depleted uranium (DU) machine turnings in lathe coolant (Cimcool) were buried in the western end of T-1 Trench. Some drums may be overpacked. The drums are reportedly double stacked in rows of 4 to 5 drums, end-on-end in the trench and covered with one to two feet of soil. There is no documentation to indicate what materials are present in the rest of the Trench. However, interviews with employees suggest that the remainder of the Trench contains trash and debris (crushed drums, pallets, paper).

T-1 Trench contains drums of DU waste from Building 444. Building 444 production operations were conducted to support war reserve, special order, and manufacturing development work. Weapons components were fabricated from various metals including DU, beryllium, stainless steel and aluminum. The machining operations in Building 444 produced DU chips that were treated in the chip roaster in Building 447. The chip roaster was out of service from 1959 to 1961 and consequently the DU and lathe coolant was stored in drums and buried in T-1 Trench.

Historical information also indicates that other wastes from Building 444 are buried in T-1 Trench. These include ten drums of cemented cyanide, one drum of "still bottoms" and one of "copper alloy".

In 1982, weed-cutting activities exposed two drums at the Trench. Sampling and analysis indicated that one drum contained an oil/water mixture and one an oily sludge. Both analyses documented that plutonium and uranium were present in the drums.

2.2.2 Current Conditions

The T-1 Trench area was investigated as part of the Phase II RFI/RI at OU 2 and additional characterization was conducted as part of the 1995 Trenches and Mound Site investigation. Because of the potential presence of pyrophoric DU, no drilling or subsurface sampling was performed inside the T-1 Trench boundaries. Investigations at T-1 Trench included evaluation of aerial photographs, electromagnetic and ground penetrating radar surveys, and soil gas surveys.

The findings of the RFI/RI investigation were consistent with historical information.

3 Project Approach

The T-1 Trench remediation will be managed by RMRS. RMRS will also be responsible for excavation of trench materials. Starmet will support RMRS activities by segregating, sampling, packaging, and treating potentially pyrophoric trench materials.

3.1 Starmet Team Organization

The Starmet Team Organization is shown in Figure 3. A brief description of key personnel responsibilities is listed below.

3.1.1 Project Manager

Mr. Donald Barbour, the project manager, has the final responsibility for the Starmet Team's performance on all tasks. He is the senior point of contact for RMRS' contracting personnel and will be available to technical managers on an as-needed basis. The project manager has the authority to suspend operations pending H&S investigations and to commit Starmet resources to perform the required tasks. Mr. Barbour will ensure quality assurance of technical and project management tasks. Specific responsibilities include the following:

- Providing top-level communication with RMRS, team members, and subcontractors.
- Ensuring that all work crews have adequate resources to perform all tasks with proper PPE available and in use.
- Managing all contracts and subcontracts.
- Providing final review of project documents.

3.1.2 Field Project Supervisor

Mr. Nicholas Lombardo is the field project supervisor for this project. He is responsible for assisting the project manager on all phases of the project and will act on the project manager's behalf as required. He has the authority to suspend operations pending H&S investigations and to commit Stoller resources to perform required tasks. His specific responsibilities include the following:

- Interfacing with the RMRS technical representatives.
- Managing day-to-day on-site performance.
- Supervising staff and assigning work.
- Ensuring that all personnel have proper training and certification.
- Attending project status meetings.

3.1.3 Lead Health and Safety Specialist

Ms. Debra Nims is the lead health and safety officer for the T-1 Trench project. She is responsible for development of the project-specific HASP for RFETS on-site activities and its implementation. She will ensure that all field activities are performed in accordance with the HASP. Ms. Nims will work with the project managers to ensure that health and safety procedures are followed. She will instruct the on-site health and safety specialist in all appropriate field and documentation procedures. Ms. Nims will identify potential health and safety concerns and develop corrective actions to mitigate or correct problems. She has the authority to suspend operations if at any time she deems working conditions unsafe. Eric Bickle is the lead health and safety officer for the Starmet facility. He will insure all facility activities are performed in conjunction with the facility HASP.

3.1.4 Quality Assurance / Quality Control Specialist

The quality assurance / quality control (QA/QC) specialist, Ms. Noelle Cochran, reports directly to the project manager and will be responsible for all phases of quality assurance. Ms. Cochran will develop the quality assurance portion of the work plan, which will cover QA procedures for fieldwork, data management, and documentation. She will work with the project managers to ensure that QA procedures are fully and correctly carried out. Ms. Cochran will identify potential QA concerns and develop corrective actions to mitigate or correct problems.

3.1.5 Process Manager

Mr. Colin Hundley, the process manager, is responsible for the day-to-day operation at the Starmet-CMI facility. He will oversee all treatment operations and ensure safe operations at the facility. He has the authority to commit Starmet resources to accomplish the treatment of the DU material. His specific responsibilities include:

- Interacting daily with the project manager.
- Overseeing material handling, treatment, and packaging.
- Ensuring safe operations at the Starmet facility.
- Coordinating waste acceptance sampling with the sample manager.

3.1.6 Assistant Field Project Supervisors

Mr. Curt Hull is the assistant field project supervisors for the T-1 Trench project. He will act as the FPS in his absence and according to his direction. When acting as the FPS he will have the same responsibilities and authority as the FPS. In addition, his responsibilities include:

- Interacting daily with the RMRS technical project manager.
- Overseeing and coordinating material handling, sampling, and analysis activities.
- Ensuring that packages are DOT-compliant prior to shipping.

- Ensuring that field activities are completed on schedule.
- Overseeing data management and transfer.
- Coordinating field schedules with the project manager, sample manager, and RMRS.
- Obtaining permits as needed.

3.1.7 Sample Managers

Mr. Douglas Gail and Mr. Geoff Asmus, the sample managers, are responsible for all sample documentation, collection, and shipment for all samples collected by the Starmet team. They will work closely with the project manager, assistant project manager, and the RMRS technical project manager to resolve sampling issues. Jim Cornwell will direct all sampling at the Starmet CMI facility. He will coordinate his activities with the sample managers.

3.1.8 Communication

Starmet understands the importance of communication within the team and with RMRS. As the prime subcontractor, Starmet will provide a single point of contact and have the ultimate responsibility for all tasks to be performed under this contract. Starmet, Stoller, and SCIENTECH will operate as a cohesive organization with an established line of authority and clearly identified personnel whom RMRS technical personnel may contact directly. Weekly project team meetings will ensure internal team communication. All Starmet personnel will participate in the RMRS self-assessment program as appropriate.

3.2 Overall Approach

The approach to the T-1 Trench remediation described in this section is based on discussions at the Activity Control Envelope (ACE) meeting that took place from December 15 to 19, 1997, and other meetings with RMRS program and project managers. Because of the interactive nature of the remediation, RMRS activities are briefly described

3.2.1 RMRS Activities

T-1 Trench remediation will be managed by RMRS and RMRS will be responsible for the following activities:

- Excavation of the trench and trench materials.
- Preliminary segregation of materials.
- Disposition of unknowns from the trench.
- Disposition of trench soils and debris.
- Transfer of DU-containing drums and soil to Starmet.
- Stockpile management.
- Laboratory analysis.
- Initial packaging of soil and debris.

- Initial packaging of soil and debris.
- Final site reclamation.
- Screening of drums before shipment.
- Excavation health and safety.
- Overall project health and safety.

The T-1 Trench will be excavated by RMRS. Soil and debris will be removed, screened and moved out of the trench area. The RMRS excavation process will include piercing the lids of intact drums with an opening sufficient to allow sampling (or removing the drum lid, if practicable) and inspection to determine the drum contents. Intact and virtually intact drums will be uprighted and placed in an overpack. Commingled DU and soil will be placed in 7A, Type A, steel "B-12" boxes. Drums and boxes will be transported to the Starmet sampling and inerting pad (SIP).

3.2.2 Starmet Activities

3.2.2.1 Training

All personnel working at the SIP will receive Starmet-required and RFETS-specific training appropriate to their individual tasks before work begins. All Starmet training requirements and programs will be approved by RMRS. Site workers will have completed the following training as appropriate:

- 40-Hour Hazardous Waste Site Worker Health and Safety Training.
- 8-Hour Hazardous Waste Site Worker Health and Safety Refresher Training.
- Hazardous Waste Site Worker Health and Safety Training Supervisor Training (if appropriate).
- Respirator Indoctrination.
- Respirator Fit Test.
- Medical Monitoring.
- Hazard Communication.
- Ladder Safety.
- Fire Extinguisher/Use Safety.
- Hearing Conservation.
- RFETS Radiation Worker II Training.
- RFETS Radiation Worker Practical Factors.
- RFETS Level B PPE Indoctrination.
- Pre-evolution Briefing.
- RFETS Lock Out/Tag Out Awareness.
- RFETS Pyrophoric Metal Fire Extinguishment.
- DOT Hazmat Employee Training (49 CFR 172.700).

Records of training certification for all team on-site personnel will be maintained at the project site for the duration of on-site activities. In addition, all field operations staff will satisfy RFETS drug screen and background check requirements prior to arrival at the job site.

3.2.2.2 Mobilization

Starmet mobilization activities include obtaining all required RFETS badges and field permits and movement of all required equipment to the site including:

- General office equipment including a computer, printer, telephone, desks, chairs, drinking water, field logbooks, clip boards, etc.
- Field operations equipment including liner and materials for construction of the SIP, and miscellaneous PPE, sampling and decontamination supplies.
- Mineral oil stored on-site in 55-gallon drums for inerting the depleted uranium.
- Material packaging equipment including a supply of B-12 or similar 7A, Type A certified boxes and overpack drums supplied by RMRS.

3.2.2.3 Site Preparation

Site preparation will take place immediately following mobilization of manpower and equipment to the site. Specific subtasks carried out during site preparation will include the following:

- Clearance of underground utilities.
- Placement of a SEALAND container.
- Marking all work zones as indicated in the HASP.
- Construction of the SIP.

A SEALAND container will be placed in the support zone to store inerting agent and miscellaneous supplies for the duration of the project.

The construction of the SIP will include several steps. The area will be cleared of underground utilities. A 6 to 9" high soil berm will be constructed from native soil around the perimeter of the SIP, a 20' by 50' area. The inside surface of the berm will be cleared of all sharp objects and other extraneous material that could have an adverse effect on the HDPE liner. This native soil surface will then be surveyed with the FIDLER on a simple random pattern to determine pre-project contaminant concentrations. After site preparation is complete, a HDPE one piece liner will be placed over the bermed area. A thin (approximately 3" thick) layer of gravel will be placed over the liner to protect it and to provide a working surface for manpower and equipment. A power drop of 2-20 amp, 120-volt receptacles will be installed by RMRS for the operation of pumps and other equipment as necessary. Electrical and mechanical specifications for the SIP are described in the Starmet Electric and Mechanical Plan.

3.2.2.4 Material Handling

Starmet anticipates that material will arrive at the SIP in several types of containers: overpacked intact drums, overpacked nominally intact drums, and loose commingled DU and soil material in metal B-12 containers. Material handling activities are shown in Figure 4.

Solid materials and sludges will initially be inspected by RMRS and segregated to the extent practicable into the following waste categories:

- DU chips and turnings.
- DU chips and turnings commingled with soil.
- Suspected cemented cyanide.
- Suspected still bottoms.
- Suspected classified items.
- Debris.
- Unknown wastes.

RMRS will handle suspected classified items, and debris. All other wastes will be transferred to the Starmet SIP. Containers will be weighed at the SIP as they arrive and as they leave after inerting.

Intact Drums

The specific handling logic diagram for this material is shown in Figure 5. Intact drums will be visually inspected to determine if DU is present, and if the material contains solids, liquids, or sludges. Liquids, including Cimcool coolant or other liquids, will be pumped from the drum into a separate drum and will be sampled for subsequent analysis per the Starmet SAP. Drums of liquids will be returned to RMRS for disposition after sampling for characterization by Starmet.

Drum contents will be sampled for radioactive materials and RCRA analyses per the Starmet SAP. All depleted uranium chips and turnings will be assumed to be pyrophoric and will be packaged and shipped as such. It is expected that the DU chips and turnings stored in Cimcool will have degraded into sludge on the drum bottom. If any turnings are not degraded into the sludge on the bottom, they will be manually consolidated with a small flat plate-like tool on the end of a rod to compress the material. Solid DU chips and turnings will be covered to at least two inches above the level of the material with mineral oil to render the material inert, in accordance with DOT requirements for shipping pyrophoric materials (49 CFR 173.418). The inerted drums will be sealed and will be braced in position inside the overpack drum by insertion of wooden blocks in the annulus, as specified in the packaging plan that will be submitted to the Traffic Management group. The annulus between the drum and overpack will then be filled with mineral oil to the same level as the inner drum. Although it is not a requirement for low-level waste, Starmet will use overpack drum lids fitted with a filtered pressure vent, as

agreed at the ACE review meeting. All packing will be compliant with operations order OO-T1-07.

Starmet will decontaminate the external surfaces of the sealed overpack drums. RMRS will then transfer the packaged drum to the designated staging area within the work structure. After radiation and contamination surveys are performed by a radiological control technician (RCT), the drum will be moved outside the structure, and placed in a covered storage area pending receipt of analytical results. RMRS will prepare shipping papers and Starmet will ship the drums in closed vans by qualified common carrier in "exclusive use" to the Starmet facility in South Carolina for treatment.

Nominally Intact Leaky Drums

If a drum can be lifted from the trench with the bulk of its contents remaining inside, the drum will be loaded into an overpack drum at the excavation trench by RMRS and transferred to the Starmet SIP. After inerting the drum contents, the turnings will be compressed and the drum will be sampled as described above for the intact drums. These drums will be packaged and managed as described above. The handling logic for this material is shown in Figure 6.

Completely Degraded Drums and Soil with Depleted Uranium Contamination

If corrosion has converted the drums to little more than an oxide shell, then the soil, drum and depleted uranium contents will be containerized in 45 cubic foot DOT specification 7A, Type A steel boxes provided by RMRS. These boxes will serve as both the RMRS hopper and the shipping container. RMRS will fill approximately 90 percent of the container.

The boxes will be inspected in accordance with operations order OO-T-107 and sampled in accordance with the SAP. Additional dry soil, selected from the soil stockpile by RMRS, will be added as required to the top of the container to exclude all oxygen that might potentially react with any metallic uranium in the soil during shipping. The soil serves three functions:

(1) It serves as a dispersant to reduce the average concentration of potentially pyrophoric material per unit volume to levels that would not sustain a reaction.

(2) It excludes air by occupying all of the space in the box, which is therefore unavailable to support combustion.

(3) It functions as a heat transfer medium to insure that heat from any localized region of slow oxidation is dissipated, limiting increases in localized temperatures and reaction rates.

The handling logic diagram for this material is shown in Figure 7. After inerting the containers will be closed. The containers will be prefitted with a filtered pressure vent. Starmet will then decontaminate the exterior of containers per section 3.2.2.9 of this

document. RMRS will then transfer the containers to the covered storage area outside the structure after successful completion of a radiation and contamination surveys.

Other Drums and Materials

Drums containing cemented cyanide and still bottoms will be sampled per the Starmet SAP, transferred to an appropriate container as necessary, and returned to RMRS for disposition. The handling logic diagram for this material is shown in Figure 8. Suspected classified items will be segregated from drum materials and held for inspection by RFETS Classification Office.

The systematic separation of debris from containers transported to the SIP will be conducted during treatment of the materials at the Starmet South Carolina facility. Intrusive retrieval of debris from materials (e.g. digging for debris) will not be performed at the SIP, so as to minimize potential for airborne dispersion of radiological contamination within the work structure. Large pieces of debris, lying on or protruding from the surface of the material, however, will be removed, consolidated in a container, and returned to RMRS.

Record-Keeping

Starmet will maintain records of all drums and boxes received from RMRS. Records will include, but are not limited to, date of receipt, type of container, contents of container, sample numbers, date of packaging, decontamination, post decontamination survey results, weight, and storage location.

3.2.2.5 T-1 Sampling and Analysis Plan for Removal and Treatment of DU

The SAP is designed to support the characterization of specific waste streams expected to be generated during T-1 remediation. The activities outlined in the SAP include the characterization of:

- Excavated DU material to facilitate shipment of the material to Starmet for treatment.
- Final treated waste products at Starmet to facilitate shipment of the material to Envirocare or the Nevada Test Site (NTS) for disposal.
- Excavated cemented cyanides and still bottoms to facilitate future management decisions.
- Liquids/sludges and lathe coolant (Cimcool) drained from intact drums of DU to facilitate treatment at onsite facilities.

Characterization of other materials generated during excavation of the trench, including segregated contaminated excavated soils, incidental waters, trash, debris, artifacts, and secondary wastes are covered under the "Sampling and Analysis Plan for the Source Removal at Trench 1", (RMRS, 1997).

Sampling and analytical testing activities will be conducted (by RMRS) in accordance with the RMRS Quality Assurance Program Description (QAPD) (RMRS, 1996b). Site

and ambient air monitoring will also be conducted, however, these activities will be addressed in the T-1 HASP and in the Trench 1 Source Removal Air Monitoring Plan.

3.2.2.6 Quality Assurance

Starmet has developed a project specific Quality Assurance Project Plan (QAPjP) to assure that activities conducted during this project exceed RMRS quality requirements. The Starmet QAPjP is in conformance with the RMRS Environmental Restoration Project (ERP) Quality Assurance Project Plan, the Quality Assurance Program Description (QAPD), QAMS-005 "Interim Guideline and Specifications for Preparing Quality Assurance Project Plans", and NQA-1. The Starmet QAPjP includes quality assurance requirements for the organization; personnel qualification; training; operating procedures; quality control; design and control of scientific and engineered processes; procedures and drawings; document control; control of purchased items; inspection; control of measuring and test equipment; handling, storage, and shipping; control of nonconforming items; accessibility and records; and records turnover.

3.2.2.7 Transportation

Starmet will evaluate the results of sample analysis. Containers that meet the Starmet CMI Waste Acceptance Criteria (WAC) for this project (i.e. Pu concentration < 50 pCi/g, no RCRA metals above the EPA regulatory threshold, and no volatile organic compounds (VOCs) or semivolatile organic compounds (SVOCs) above EPA thresholds as modified by any "contained in" project exception limits established by the CDPHE) will be weighed by Starmet Team personnel for shipment to Starmet, CMI's Barnwell, SC facility for treatment. The containers will be labeled with appropriate DOT labels. The package will be marked as an EPA reportable quantity ("RQ") if it potentially contains 612 lbs. or more of depleted uranium. This determination will be based on predetermined threshold gross weights for the soil boxes and overpack drums derived from container tare weights and the average apparent bulk density of soil adjacent to Trench T-1. Starmet will load containers into 45-foot closed vans, and/or flatbed in exclusive use, for shipment by a designated, qualified common carrier pre-approved by RMRS. Starmet will provide detailed package data for each shipment to RMRS, who will prepare appropriate shipping papers and manifests. RMRS will deliver all shipping papers to the Starmet Site Supervisor, who will give them to the driver, give the driver a final briefing, and release the shipment.

Shipments will be configured, when practicable, as full loads of 40,000 lbs. net weight. Both overpacked drums and metal boxes of commingled soil and DU may be combined in a single shipment. If the pace of the excavation, response time for sample analysis, or other factors result in on-site storage times for inerted material that RMRS considers excessive or undesirable, Starmet is prepared to release less than full load shipments subject to appropriate approvals by RMRS.

3.2.2.8 Waste Treatment

All drums and boxes received at Starmet from RFETS will be catalogued. Receipt records will include, but not be limited to, date of receipt, origin site, type of drum, contents (per manifest), and condition of drum. Drums and boxes will be segregated and stored in a staging area at the Starmet facility before treatment.

Intact Drums

Drums will be placed in a catch pan and will be opened. The mineral oil will be decanted or pumped from the overpack and drum. The mineral oil will be analyzed for DU activity and then shipped to a licensed LLW processor for incineration. Drum contents will be inspected to determine the contents (depleted uranium, steel, debris) and non-DU materials will be segregated. Segregation will take place during the screening process. All debris will be packaged in empty containers for return to RMRS.

The DU will be calcined to convert it to uranium oxide. The DU will be loaded onto trays and racks that will be lowered into a pit furnace. Material will be treated at 700°C for 2 hours.

The calcined material will be inspected. If materials are 90% uranium oxide, they will be used in the DUCRETE process. This process consists of mixing uranium oxide with clay, binder, and other additives. The mixture will be milled in a Union Process 30-S attrition mill to reduce the average particle size of the materials. The smaller particle sizes improve the pressing quality and allow the necessary reactions to occur during sintering. The material will then be dried in trays in a large oven. The cake formed during drying will be placed into a Simpson 05 muller mixer. This mixer will break up the cake and allow additional binder and moisture adjustments to be made. This mixture is then pressed in a K. R. Komarek B-220 briquettor. The briquettes are then sintered at high temperature in a Harrop pusher furnace. The sintering creates a strong dense aggregate that can be added to concrete and used in radiation shielding applications. DU turnings, after calcining to U_3O_8 that are comingled with more than 10 % soil or other constituents, which preclude achieving final sintered ceramic densities of at least 8 gm/cm^3, will be added to the soil/uranium mixture, processed, and packaged for disposal.

B-12 Containers

The contents of the B-12 containers will be poured onto a screener. The screening will separate larger pieces of material such as drum fragments and rocks that could cause damage to equipment later in the process. This material off the top of the screen will be inspected to ensure that it does not contain any pyrophoric material. Any uranium metal found will be calcined and processed. The remaining material should be large enough that it will not need further processing to meet NTS disposal requirements. The material will then be packaged in B-12 containers for inspection by an RMRS representative. Prior to filling, all containers will be inspected in accordance with Starmet CMI procedures. The RMRS representative will be provided with any information needed to

inspect the material and create a manifest. The material will then be shipped as directed by RMRS.

The material that passes through the screen will be calcined to convert any pyrophoric uranium materials to stable uranium oxides. The calcining will be done in a rotary calciner at approximately 700°C. The calcining process should eliminate any pyrophoric tendencies of the material. Starmet will monitor the calcining process parameters and will perform periodic checks on material exiting the calcinor to insure process effectiveness. Material will be recalcined, if necessary, to achieve complete conversion to U_3O_8. Clays, binders, and moisture may then be mixed into the material using a Simpson 05 muller mixer, or a similar mixer. These additives will give the parts strength during and after pressing. A K. R. Komarek B-220 briquetter will be used for the pressing operation. The pressing will increase the average particle size of the material. This must be done to meet the NTS requirement for average particle size. If the briquettes are found to contain significant amounts of moisture, they will be dried in a drying oven. An RMRS representative will then package the material in B-12 containers for inspection. Prior to filling, all containers will be inspected in accordance with operations order OO-T1-07. The RMRS representative will be provided with any information needed to inspect the material and create a manifest. The material will then be shipped as directed by RMRS.

Record Keeping

Starmet will keep records of all materials received from RFETS. Records will include, but not be limited to, shipping manifests, receipt documents, storage documents, process documents, final waste forms, weights or volumes and packaging documents.

3.2.2.9 Decontamination and Demobilization

Decontamination

This section addresses the Starmet contamination control and decontamination procedures for small equipment, large equipment, and emergency decontamination. Effective decontamination procedures are required to minimize the potential for cross-contamination, offsite contaminant migration, and personnel exposure. Starmet will perform decontamination on all material and equipment for which they are responsible prior to the equipment leaving the structure. All equipment and material containers will be considered contaminated and requiring decontamination due to the proximity to the IHSS. Decontamination will consist primarily of two categories: equipment decontamination and container decontamination. All Starmet decontamination will take place at the SIP within the containment structure (lined pad).

Contamination Control

All tasks will be performed in accordance with the Project HASP and the PAM. Additionally, daily job briefings will be conducted that will include a review of the Radiation Work Permit (RWP) requirements and the importance to minimize contact

with IHSS soils (i.e., no kneeling, kicking dirt, or unnecessary walking in these areas). Tasks will be conducted according to ALARA principles. Additional information regarding personnel decontamination may be found in RFETS SOPs, and the RFETS RCM.

Emergency Site Exit Procedures

In the event of a personnel-, weather-, or equipment-related emergency, emergency decontamination procedures described below will be followed:

(1) Assess the situation. Is it life-threatening?

(2) If the situation is not life threatening, perform usual decontamination.

(3) If the situation is life threatening (e.g., heart attack, fire, explosion), perform minimal decontamination as allowable to move personnel to safety.

The project supervisor will be apprised of the situation and will immediately inform medical emergency response personnel of the potential for exposure to radiological contaminants, if appropriate. Emergency exit points will consist of all manway doors in the structure.

Equipment Decontamination

It is the responsibility of the project supervisor to ensure that all pieces of equipment (surveying, sampling, excavating or PPE) coming off the site are properly decontaminated. Equipment will require a radiological survey by a RFETS RADCON representative in order to leave the radiologically controlled area. The decontamination steps for large and small pieces of equipment are described below.

Heavy Equipment Decontamination

Heavy equipment, used for container handling tasks, will be decontaminated by:

(1) Dry mechanical means (scraping with tools) or by applying tape to lift and capture specific particulate contamination.

(2) Hydraulically, by wiping the area with a moistened muslin (or equivalent). Dry-decontamination methods will be used initially to minimize waste generation.

If fixed contamination is found, RFETS RADCON will be notified for further guidance.

When all pyrophoric material has been shipped off-site, the remainder of the Starmet equipment will be decontaminated and prepared for demobilization. All equipment that has entered the high contamination area (HCA) will be brought to the SIP for decontamination. Dry decontamination techniques will be utilized whenever possible to minimize the volumes and types of waste streams produced. All equipment will be

subject to the necessary radiological screening and sampling to confirm applicable release limits specified by the RFETS RCM.

Small Equipment Decontamination

Small equipment includes hand tools, sampling equipment, and other pieces of equipment. Scrub brushes will be used to dry-decontaminate small equipment. Wiping techniques will be used if dry-decontamination methods prove ineffective.

Waste generated from decontamination tasks will be collected in the appropriate RFETS-supplied containers and labeled in accordance with RFETS RCM requirements. These materials will be sampled in accordance with the SAP.

Container Decontamination

Material excavated from the trench will arrive at the SIP in either 85-gallon overpack drums or "B-12" steel boxes. These containers will have been in contact with IHSS soils and will be considered contaminated. The exterior of these containers will be decontaminated at the SIP prior to leaving the structure. The outer surface of the containers will be decontaminated by

(1) dry mechanical means (brushing, wiping, scraping with tools) or by applying tape to lift and capture specific particulate contamination.

(2) hydraulically, by wiping the area with a moistened muslin (or equivalent). Dry-decontamination methods will be used initially to minimize waste generation.

All drums and metal boxes will be externally cleaned of gross contamination immediately following inerting at the SIP. The exteriors will undergo the necessary radiological screening and sampling to confirm applicable release limits specified by the RFETS RCM. Final decontamination of waste packages will be performed at the SIP or in a staging area inside the structure.

Investigative-Derived Materials

All investigative-derived materials (IDM), including contaminated disposable PPE, decontamination wipes, and decontamination supplies, will be segregated and containerized on site. RFETS Environmental Protection personnel will be contacted to determine specific information as to the handling, permitting, and storage locations for IDM containers.

Demobilization

After RMRS approval of the radiological survey results, the equipment will be demobilized from RFETS. The SIP area and any other areas impacted by operation of the Starmet team will then be surveyed with a FIDLER, sampled and subsequently re-graded as necessary.

4 Schedule

The Starmet schedule (Figure 9) is based on RMRS's activities including excavating the material from the trench, performing initial characterization, and providing the material to Starmet for sampling and packaging in a timely manner. The schedule has a start date of November 21, 1997 and has been statused as of January 7, 1998 with progress on activities that have started and completion dates where applicable.

Several tasks have been rescheduled. The ACE work session was rescheduled from December 15 through 19, 1997. The new HASP and SAP delivery dates of January 28, 1998 follow receipt of comments. Mobilization has been moved to after plan approvals. Also reflected in this updated schedule is the increase in the Waste Material Segregation activity from 30 to 40 days. Also included is a three-week rolling schedule beginning January 7, 1998.

5 Reporting

5.1 Weekly Reports

Starmet will provide the RMRS CTR with weekly progress reports once treatment and packaging. Reports will describe all activities performed during the week and will be submitted to RMRS by Monday at 4:00 P.M. the following week. The weekly report will be 2 to 3 pages in length and will include all backup documentation. The weekly report will include, but not be limited to, the following:

- Project name, location, and reporting period.
- Activities completed during the prior week.
- Comparison of forecast with actual activities.
- Plans for the following week including required RFETS services and support.
- Descriptions and lists of material volumes and/or number of drums.
  - Received from RMRS.
  - Treated.
  - Inspected and achieved/failed WAC, reasons for failure, and handling options.
  - Quantity of material recycled for beneficial reuse.
  - Packaged for transfer to RMRS.
  - Other issues such as unique handling activities.
- Samples collected and analytical results.
- Daily staffing and equipment.
- Operation issues, recommended resolutions, and impacts to the project schedule.

Starmet will also provide the CTR with copies of all accident/incident investigation reports and a three-week rolling schedule.

5.2 Project Summary Reports

Starmet will provide the RMRS CTR a Project Summary Report (PSR) within 30 days of completing material treatment and packaging. The PSR will include, but not be limited to, the following information:

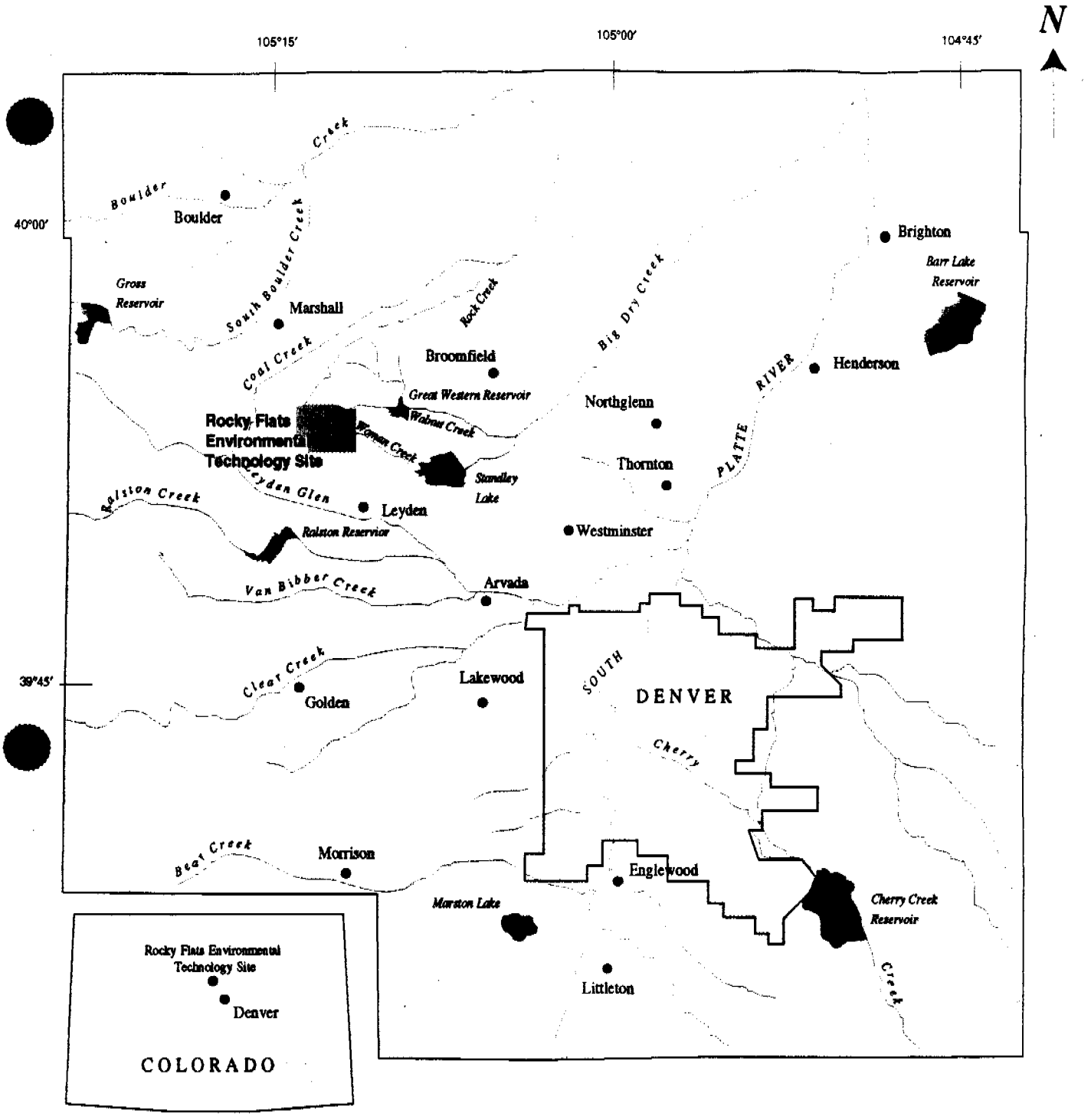
- Activities performed including:
  - Sequence of events.
  - Changes to the Work Plan.
- Actual project schedule and deviations from the original project schedule.
- Quantities of waste material received, treated, packaged.
- Quantity of material recycled for beneficial reuse.
- Number and identification of samples and analytical results.
- Project issues including resolution and lessons learned.

6 References

RMRS, 1997, Sampling and Analysis Plan for the Source Removal at T-1 Trench.

RMRS, 1996a, Proposed Action Memorandum for Source Removal at the T-1 Trench Site IHSS 108.

RMRS, 1996b, RMRS Quality Assurance Program Description.



Pyrophoric Depleted Uranium Source Removal from T-1 Trench (IHSS 108) **Work Plan**	
Location of the Rocky Flats Environmental Technology Site	
April 1998	Figure 1

pr\3428\1Etrench\sitemap

Rocky Flats Environmental Technology Site T-1 Trench
Starmet Organizational Chart
Figure 3

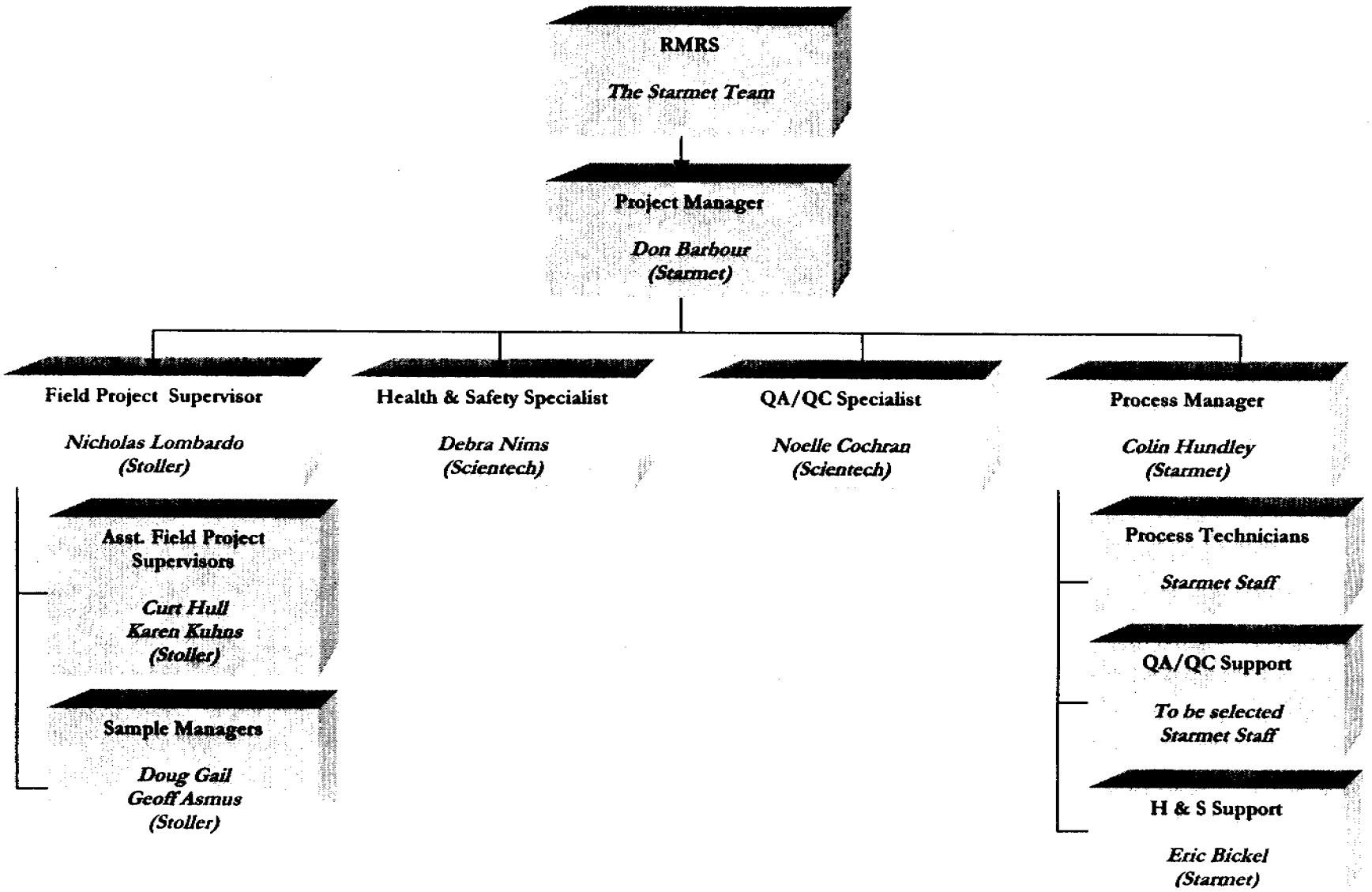


Figure 5. T-1 Trench Excavation Handling and Analysis Logic Diagram
Intact Drums

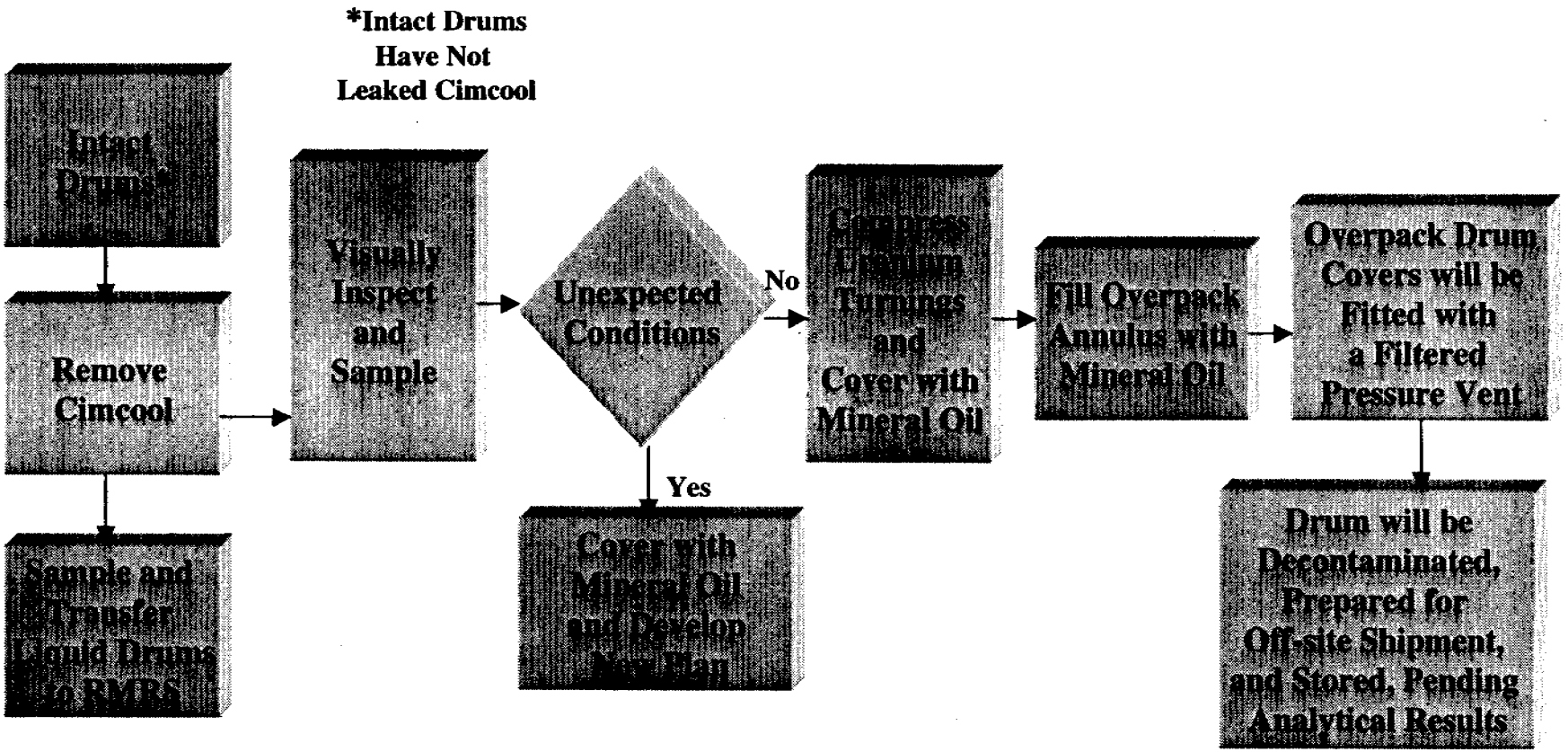


Figure 6. T-1 Trench Excavation Handling and Analysis Logic Diagram
Nominally Intact Leaky Drums

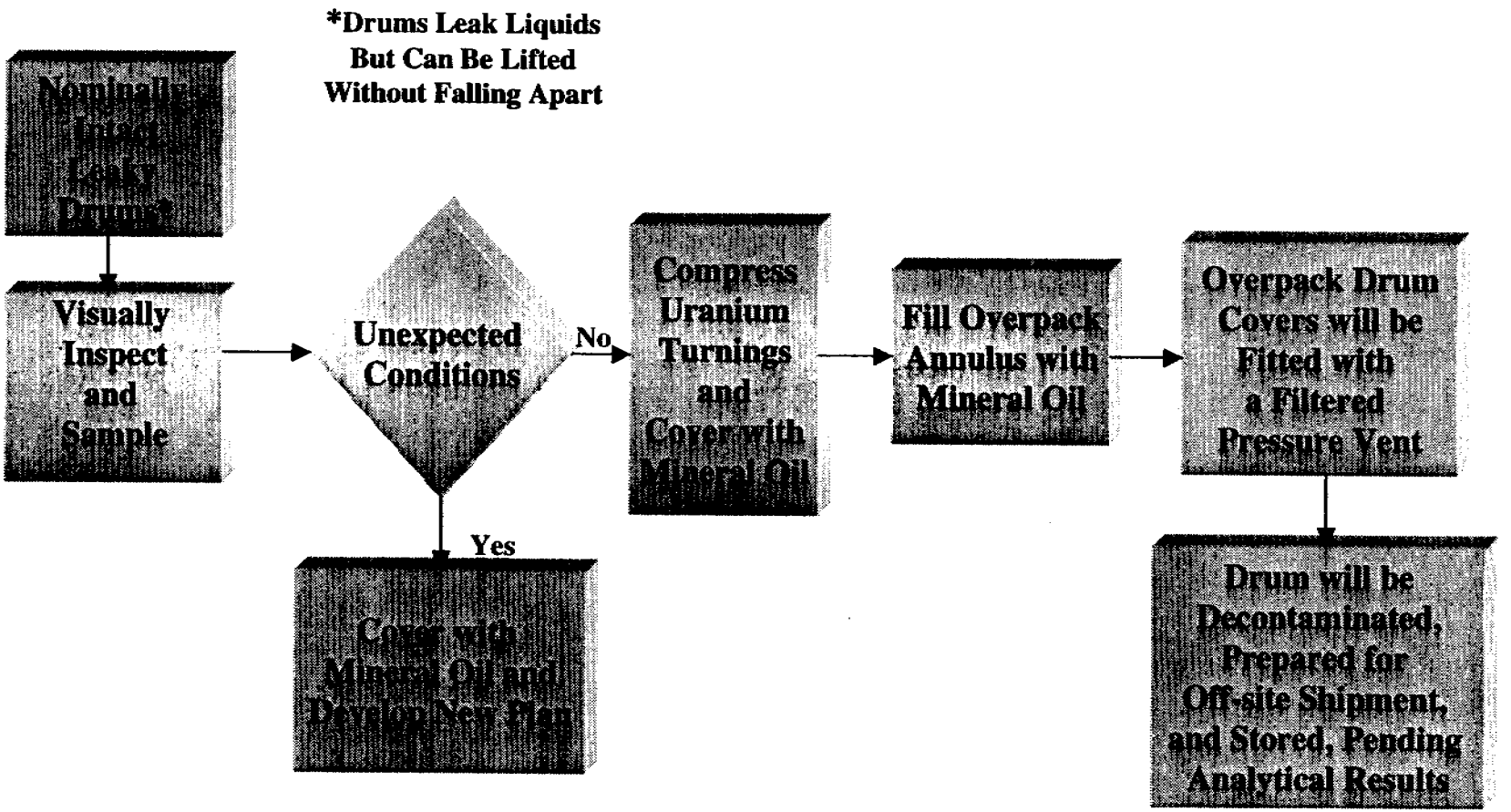


Figure 7. T-1 Trench Excavation Handling and Analysis Logic Diagram Commingled Uranium and Soil

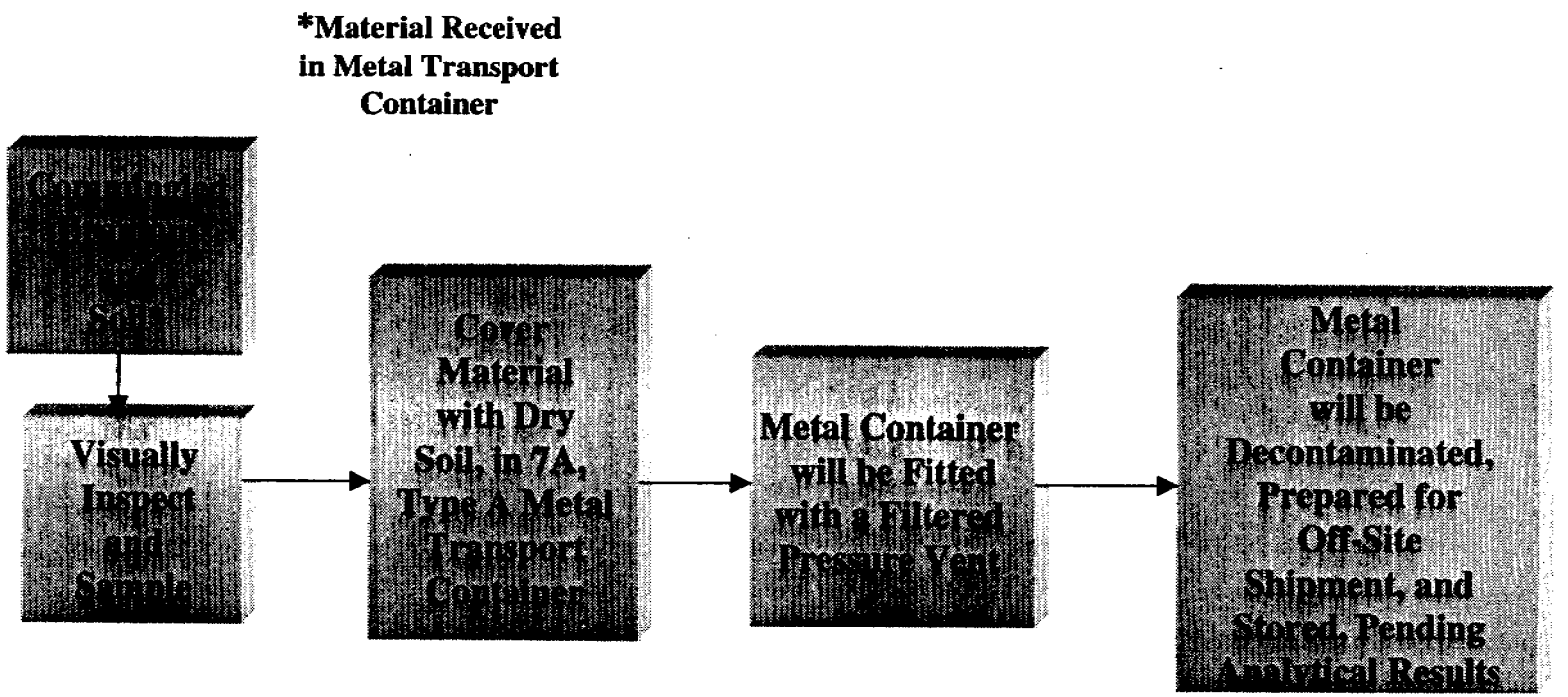
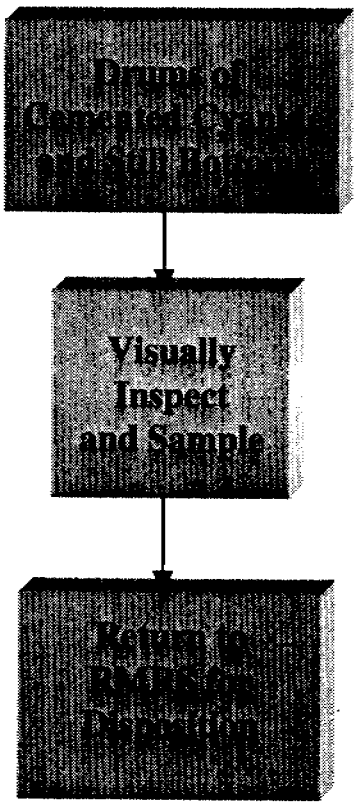
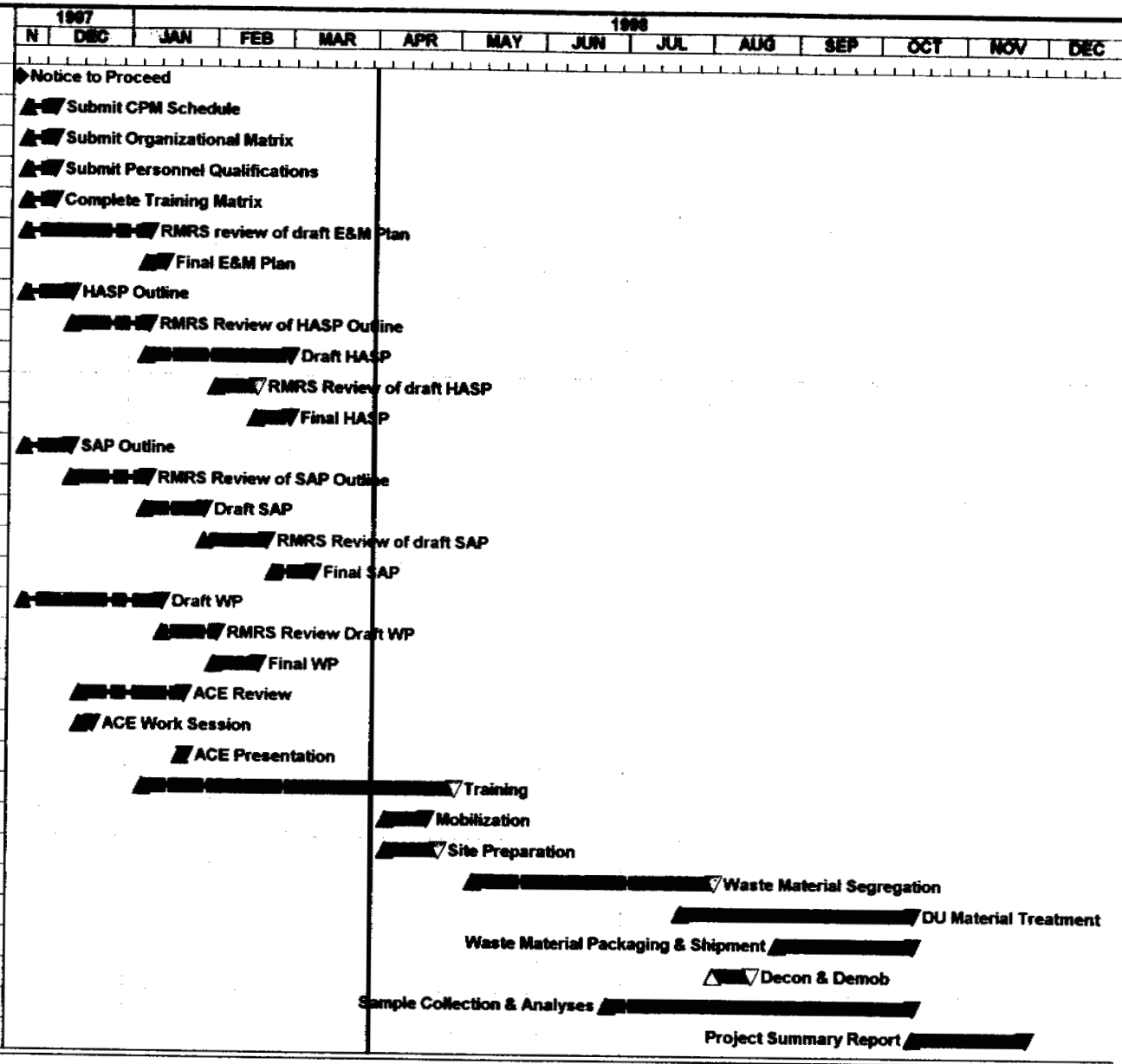


Figure 8. T-1 Trench Excavation Handling and Analysis Logic Diagram
Cemented Cyanide Waste and Still Bottoms



Activity ID	Activity Description	Orig Dur	Planned Start	Planned Finish
100	Notice to Proceed	0	21NOV97A	
110	Submit CPM Schedule	5	24NOV97A	03DEC97A
120	Submit Organizational Matrix	5	24NOV97A	03DEC97A
130	Submit Personnel Qualifications	5	24NOV97A	03DEC97A
140	Complete Training Matrix	5	24NOV97A	03DEC97A
150	RMRS review of draft E&M Plan	10	24NOV97A	07JAN98A
155	Final E&M Plan	15	07JAN98A	13JAN98A
160	HASP Outline	10	24NOV97A	10DEC97A
170	RMRS Review of HASP Outline	5	11DEC97A	07JAN98A
180	Draft HASP	15	07JAN98A	28FEB98A
190	RMRS Review of draft HASP	10	02FEB98A	16FEB98
200	Final HASP	0	16FEB98A	28FEB98A
210	SAP Outline	10	24NOV97A	10DEC97A
220	RMRS Review of SAP Outline	5	11DEC97A	07JAN98A
230	Draft SAP	15	07JAN98A	28JAN98A
240	RMRS Review of draft SAP	10	29JAN98A	20FEB98A
250	Final SAP	10	23FEB98A	09MAR98A
260	Draft WP	27	24NOV97A	13JAN98A
270	RMRS Review Draft WP	10	14JAN98A	02FEB98A
280	Final WP	0	02FEB98A	17FEB98A
300	ACE Review	17	15DEC97A	21JAN98A
310	ACE Work Session	5	15DEC97A	19DEC97A
320	ACE Presentation	1	21JAN98A	22JAN98A
330	Training	78	07JAN98A	30APR98
340	Mobilization	10	06APR98A	20APR98A
350	Site Preparation	15	06APR98A	24APR98
360	Waste Material Segregation	60	08MAY98A	03AUG98
370	DU Material Treatment	60	23JUL98	14OCT98
380	Waste Material Packaging &	35	27AUG98	14OCT98
390	Decon & Demob	10	04AUG98	17AUG98
400	Sample Collection & Analyses	78*	26JUN98	14OCT98
500	Project Summary Report	30	15OCT98	25NOV98



Project Start 21NOV97
Project Finish 26NOV98
Data Date 01APR98
Run Date 02APR98

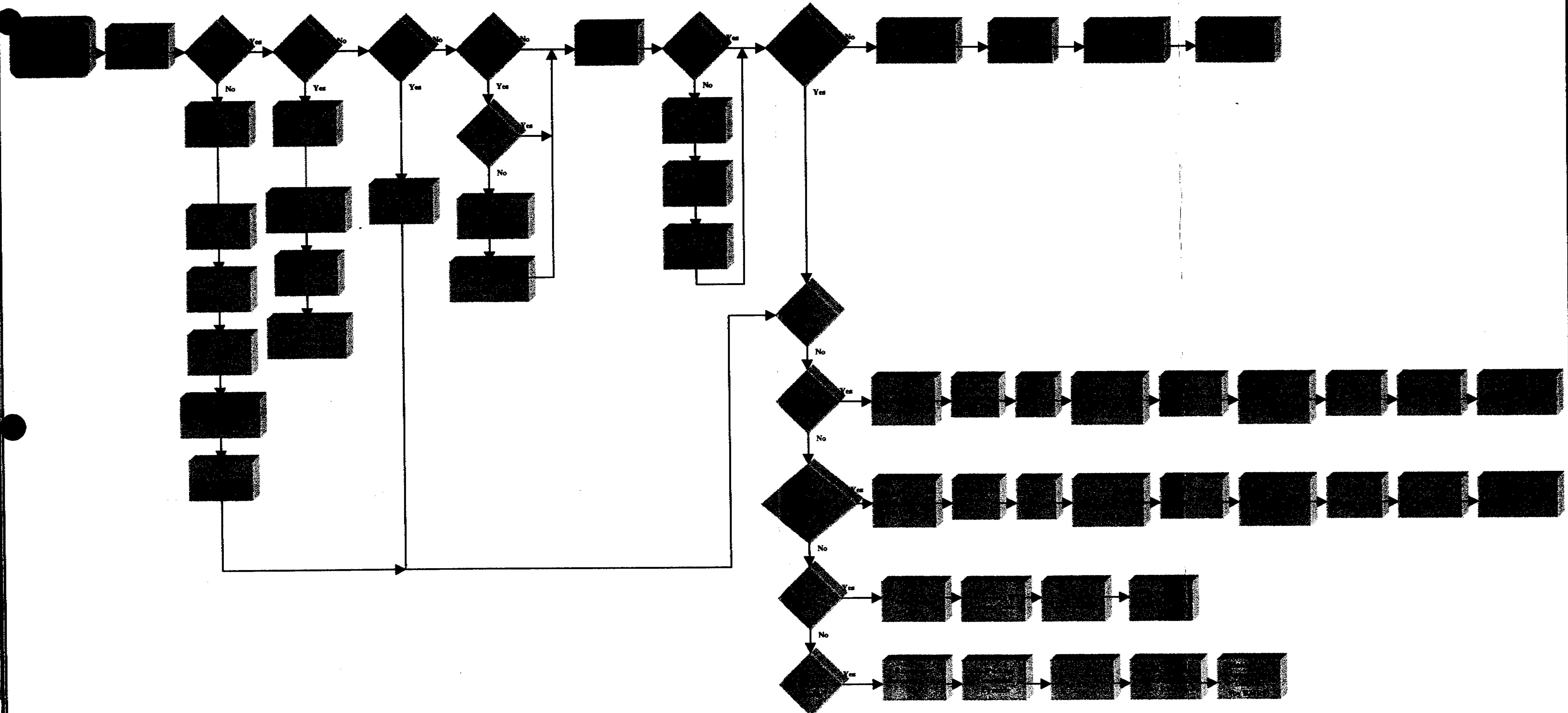
Early Bar
Progress Bar
Critical Activity

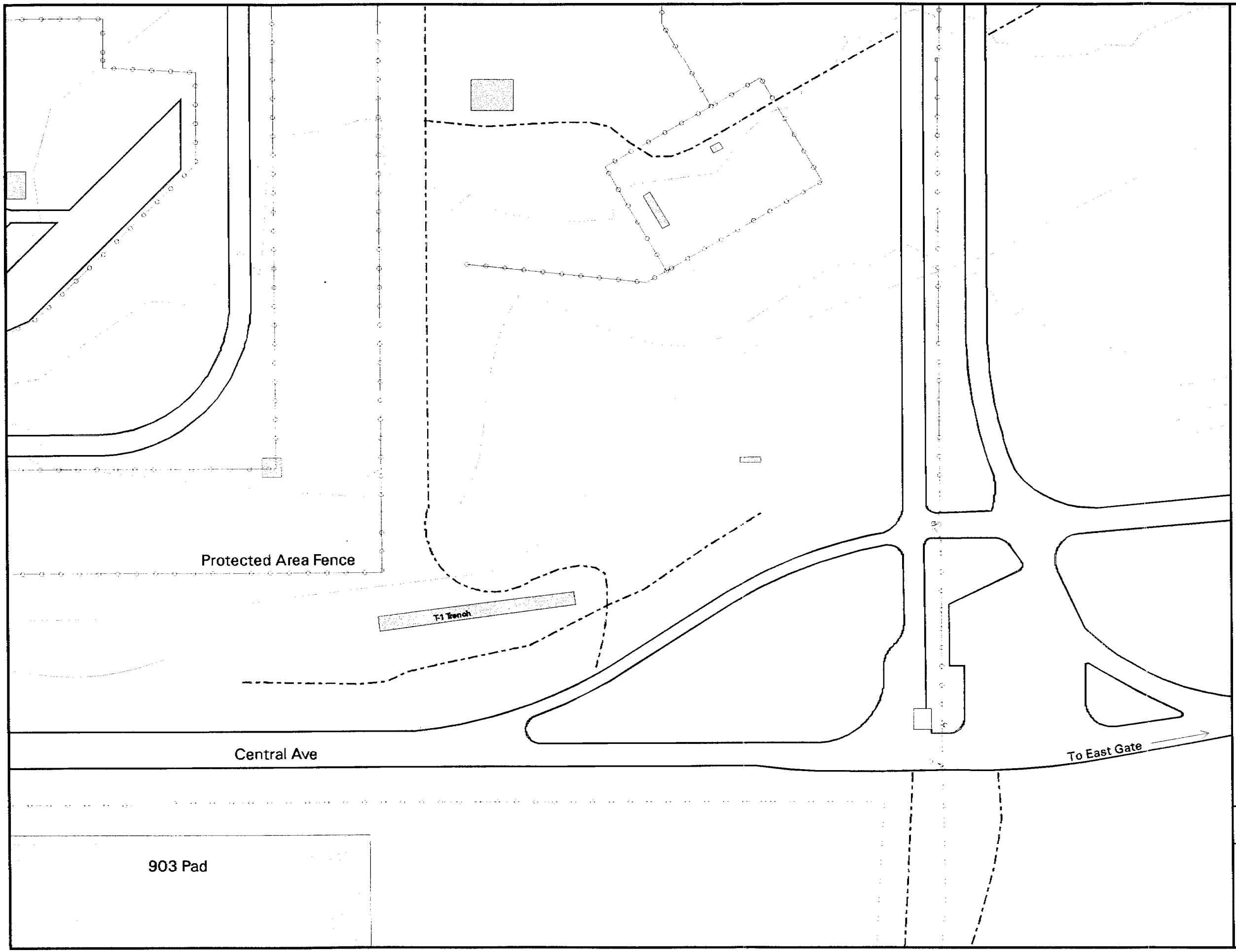
TRH4

Sheet 1 of 1

Pyrophoric DU Source Removal - RFETS
Trench T-1 (IHSS,108)
Starmet Corporation

Figure 4. T-1 Trench Material Handling Activities





Explanation

- Paved Roads
- Dirt Roads
- Topography
- Hydrography
- Fences
- Buildings
- T-1 Trench

DATA SOURCE
Buildings, fences, hydrography, roads and other structures from 1994 aerial photography captured by EG&G RSL, Las Vegas. Digitized from the orthophotographs January 1995.

N
W E
S

Scale = 1 : 1080
1 inch = 90 feet

45 0 90 135

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

Stoller
established 1959

U.S. Department of Energy
Rocky Flats Environmental Technology Site

T-1 Trench Location

Figure 1-1